

SECTION IV.—RIVERS AND FLOODS.

RIVERS AND FLOODS OF SEPTEMBER, 1915.

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[Dated: Washington, D. C., Oct. 28, 1915.]

Atmospheric conditions favorable to intense precipitation over limited areas in eastern Kansas, northeastern Iowa, northwestern Illinois, south-central Wisconsin, south-central Michigan, and west-central New York, obtained on several dates during the month. In order to show the horizontal distribution of precipitation in the flooded districts reports from many more points than are at present available would be necessary. Moreover, there were practically no river-gaging stations on the great majority of the streams affected and no comparative statistics of the stages reached can be had. The expression "higher than ever before known" is interpreted to mean an unusually high stage. The descriptions of local floods contained in news items in the public prints are overdrawn, but nevertheless they afford practically the only information at hand respecting the floods at points not occupied by the Weather Bureau river service.

In the tables which follow will be found statements, based upon actual gage readings, of the time that each river therein was in flood and also the crest stage of the flood. In the matter which follows, under the caption "Local Floods, etc.," no gage readings are available.

TABLE 1.—Flood stages in the Missouri River and tributaries, September, 1915.

River.	Station.	Flood stage.	Above flood stage.		Crest.	
			From—	To—	Stage.	Date.
		<i>Feet.</i>			<i>Feet.</i>	
Osage.....	Ottawa, Kans.....	20.0	16	26	26.2	9
Osage.....	Oscola, Mo.....	20.0	16	26	28.4	19
Grand.....	Chillicothe, Mo.....	18.0	17	17	18.9	17

TABLE 2.—Flood stages in the Arkansas River and tributaries, September, 1915.

River.	Station.	Flood stage.	Above flood stage.		Crest.	
			From—	To—	Stage.	Date.
		<i>Feet.</i>			<i>Feet.</i>	
North Canadian.....	Canton, Okla.....	3.0	20	20	3.8	27
Neosho.....	Le Roy, Kans.....	24.0	8	8	24.5	8
Neosho.....	Iola, Kans.....	10.0	7	8	14.7	7
Neosho.....	Oswego, Kans.....	20.0	13	13	22.6	21
Neosho.....	Fort Gibson, Okla.....	22.0	17	22	22.5	19
Black.....	Black Rock, Ark.....	14.0	1	14	24.9	1
White.....	Newport, Ark.....	28.0	1	1	36.0	1
White.....	Georgetown, Ark.....	22.0	1	8	24.3	1
White.....	Clarendon, Ark.....	30.0	1	10	33.0	2 & 3

TABLE 3.—Flood stages in the rivers of Texas, September, 1915.

River.	Station.	Flood stage.	Above flood stage.		Crest.	
			From—	To—	Stage.	Date.
		<i>Feet.</i>			<i>Feet.</i>	
Sabine.....	Orange, Tex.....	4.0	1	6	4.9	1
Neches.....	Beaumont, Tex.....	7.0	1	2	8.2	1
Colorado.....	Austin, Tex.....	18.0	17	17	24.7	17
Colorado.....	Columbus, Tex.....	24.0	19	21	32.5	20
Guadalupe.....	Victoria, Tex.....	16.0	23	23	17.0	23

TABLE 4.—Flood stages at other points, September, 1915.

River.	Station.	Flood stage.	Above flood stage.		Crest.	
			From—	To—	Stage.	Date.
		<i>Feet.</i>			<i>Feet.</i>	
Mississippi.....	Arkansas City, Ark.....	42.0	1	7	43.6	3
Des Moines.....	Ottumwa, Iowa.....	10.0	28	30	11.4	28
Grand.....	East Lansing, Mich.....	7.5	14	15	7.7	15
Walhonding.....	Walhonding, Ohio.....	8.0	6	6	9.7	6
Illinois.....	La Salle, Ill.....	18.0	1	2	18.3	1
Illinois.....	Beardstown, Ill.....	12.0	22	22	14.7	1
			29	30		
			1	31		

These tables, in connection with the text which follows, presents a summary of our knowledge with respect to the flood conditions during the month.

Floods in the Neosho River.—The following is abstracted from a report by Observer H. H. Holcomb, in charge of the district center at Iola, Kans.:

Excessive rains fell in southeastern Kansas on September 6 and 7, the region of greatest intensity being in Allen and Bourbon Counties, where the 24-hour fall was 6.80 inches at Iola; 10.33 inches at Moran, in Allen County, and 6.10 inches at Fort Scott, in Bourbon County. During the night of September 6-7, over Elm, Elsmore, and Marmaton Townships, in Allen County, the precipitation was in excess of 10 inches and caused the tributaries of the Neosho River, which enter the main stream in the vicinity of Iola, Kans., known as Deer Creek, Elm Creek, Coon Creek, and Big Creek, to become torrents ranging from 1 to 3 miles in width. The lowlands along these tributaries became flooded during the night and along the streets in the flooded district of Iola over 600 families were rescued by boats and rafts, in many instances after the water had reached the second story of the houses. Several hundred families were also reported to have been rescued under similar conditions at Humboldt and Fort Scott.

The Neosho River at Iola rose 14.1 feet within 12 hours and stood 4.7 feet above flood stage, which was the highest stage recorded since July 10, 1904, and within one-half foot of the stage then attained. While the damage from flooded conditions was greatest in Allen, Neosho, and Labette Counties, the river rose above flood stages along the course from Iola south to the Kansas-Oklahoma State line, a distance of 129 miles by the river channel, or 68 miles in a straight line. In this part of the river the average fall is only about 1.2 feet per mile, which, together with the meandering course and congestion by driftwood, caused a very extensive area to be flooded. Warnings were sent to Chanute, Erie, Oswego, and Chetopa, Kans., in time for the protection and removal of endangered property to places of safety.

Before this flooded condition had quite subsided excessive rains again occurred on the 14th and 15th, with 5.09 inches at Iola, nearly 5 inches on the two dates occurred at other river stations in the dis-

tract. Following the heavy rains, the reservoir for impounding the city water supply at Yates Center on Owl Creek, a tributary of the Neosho River, was broken and augmented the flooded conditions. Along the river course from Iola south to the Kansas-Oklahoma line flooded conditions were again attained. At Oswego and Chetopa the river stages exceeded the former flood of this month, and the river continued above flood stage from September 17 to 22, inclusive. The crest occurred at Oswego September 21, with a stage of 22.6 feet. Warnings were sent to points along the river in ample time for removal of property.

The greater losses were unpreventable and included bridges, crops, levees and live stock, although extensive damage was sustained by the cement mills, railroads and smelters in the flooded district. In Allen County alone five bridges were damaged until repair work became very expensive, or impossible, and new bridges must be constructed. Losses to individuals included household furniture, buildings, live stock, and in addition a complete loss of crops on the overflowed lands. The greatest damage to the railways was sustained by the Missouri Pacific, the Santa Fe, and the Missouri, Kansas & Texas Railway companies. Three thousand feet of track of the Missouri Pacific Railway was washed out. The tracks of the other companies were submerged in several localities and trains prevented from running several days. The damage to the Iola Electric Street Railway was estimated by the superintendent at \$8,000. The loss to the Iola Portland Cement Plant not only included the enforced shutting down of the mill for several weeks, where over 300 men were employed, but the removal of water 30 feet in depth from a quarry of 55 acres extent, the water pumped out of the quarry estimated at 500,000,000 gallons, before work could be resumed, and the loss totaled \$25,000.

Losses due to September, 1915, floods in Neosho River.

Buildings, factories, municipal plants, highways, bridges...	\$900,000
Crops, which may or may not have been housed.....	500,000
Prospective crops, 96,000 acres involved.....	960,000
Live stock or other movable property.....	50,000
Suspension of business, including wages of employees.....	50,000
Total.....	2,460,000

Local floods in Iowa, Illinois, Wisconsin, and New York.—Heavy local rains occurred on the 10th in lower Michigan, the rain at Grand Rapids being in the nature of a cloudburst. Sewers were inadequate to carry it off and as a consequence much damage was done by the flooding of basements.

On the 11th heavy local rains in northwestern Illinois flooded low places and caused streams to overflow. On the following day the region of heavy local rains was centered over the counties of Rock, Greene, Dane, and Lafayette, Wis. The damage to highways and bridges was unusually great. Washouts on the railroad between Janesville and Edgerton and between Edgerton and Madison caused delay in traffic and the derailment of two trains. Five lives were reported as being lost due to the floods.

The money loss in the State of Wisconsin, as reported in the press, amounted to \$1,400,000.

The same disturbance, as it moved eastward, was the cause of much loss of property in central New York during the night of the 12th, especially along Erie Canal in the vicinity of Syracuse. Newspaper reports estimate the damage to mills, factories, railroads, and dwelling houses at Skaneateles and Skaneateles Junction as amounting to \$75,000.

Northeastern Iowa, northwestern Illinois, and southwestern Wisconsin were visited by a second series of torrential rains on the 25th and 26th. According to Local Forecaster J. H. Spencer, of Dubuque, Iowa, the area of heavy rainfall extended from Blackhawk County, Iowa, to Jo Daviess County, Ill., and Grant County, Wis. All of the small streams in this region had overflowed their banks by the morning of the 27th, causing much damage to the highways, bridges, culverts, railroad beds, and crops.

The greatest damage to crops was in the bottom lands along the Galena and Maquoketa Rivers, Catfish Creek, and other smaller streams.

Following is a conservative estimate of the property loss:

Railroads.....	\$20,000
County roads and bridges.....	25,000
City of Dubuque, Iowa (roads).....	5,000
Private property.....	10,000
Crop loss.....	20,000
Total.....	80,000

Hydrographs for typical points on several principal rivers are shown on Chart I. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.

MEAN LAKE LEVELS DURING SEPTEMBER, 1915.

By UNITED STATES LAKE SURVEY.

[Dated: Detroit, Mich., Oct. 4, 1915.]

The following data are reported in the Notice to Miners of the above date:

Data.	Lakes.			
	Superior.	Michigan and Huron.	Erie.	Ontario.
Mean level during September, 1915:				
Above mean sea level at New York.....	Feet. 602.49	Feet. 579.96	Feet. 572.20	Feet. 245.45
Above or below—				
Mean stage of August, 1915.....	+0.08	—0.15	—0.12	+0.02
Mean stage of September, 1914.....	—0.32	—0.51	—0.12	—0.64
Average stage for September, last 10 years.....	—0.21	—0.85	—0.19	—0.78
Highest recorded September stage....	—1.59	—3.47	—1.74	—2.16
Lowest recorded September stage....	+1.00	+0.30	+0.92	+1.45
Probable change during October, 1915.....	—0.1	—0.2	—0.3	—0.4
Average relation of the September level to:				
August level.....	+0.1	—0.2	—0.3	—0.4
October level.....	0.0	+0.2	+0.3	+0.4